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Patentanmeldung Nr. | Patent application No. | Demande de brevet n°

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Blatt 2 der Bescheinigung
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Page 2 de l'attestation

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Compound to improve wrinkle resistance in fabrics, wrinkle reducing active as used in such a compound and a cartridge comprising such compound

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Compound to improve wrinkle resistance in fabrics, wrinkle reducing active as used in such a compound and a cartridge comprising such compound

The invention relates to a compound to improve wrinkle resistance in fabrics, comprising: a wrinkle reducing active, comprising at least one fusible elastomer, and a liquid carrier for carrying the active. The invention also relates to a wrinkle reducing active as used in such a compound. The invention further relates to a method for improving wrinkle resistance in a fabric by use of such a compound.

In Wear Wrinkle Resistance (IWWR), as the name suggests, means the property of a set fabric, e.g. cotton, which enables it to resist formation of wrinkles, especially during wear of the fabric. IWWR can be assessed by measuring the ability of a set fabric to resist the formation of wrinkles. Wrinkle resistance is generally assessed by Wrinkle Recovery Angle (WRA) tests. A well known standard test is the AATCC method 66-1998. Such tests assess the ability of fabric which is set in a flat state to recover this flat state after being folded, subjected to a temporary load, preferably 500 g during 60 s, and then released. The assessment is carried out by measuring the recovered angle (WRA) after a given time (commonly 5 minutes). The higher the angle, the better the recovery. Angles are measured in, both, the warp and weft directions and added up to give a final result of the assessment. A perfectly elastic material would give a WRA of 360 degrees. A perfectly viscous material would give a WRA of 0 degrees.

Compounds for reducing wrinkle formation in fabrics are already known. The American patent publication US 5,532,023 discloses for example a wrinkle reducing composition which can be applied to fabrics. The composition comprises a wrinkle reducing active, comprising an effective amount of silicone, and an effective amount of film-forming polymer, which active is dispersed in a liquid carrier. In particular, the disclosed composition is adapted to impart a lubricating property or increased gliding ability to fibers in fabric, particularly clothing. This gliding effect between the fibers is particularly caused by the silicone. By deformation of the clothing the resistance between the fibers of the clothing is reduced, which results commonly in a decreased energy dissipation at the fibers and (thus) also a relatively good and easy contra-deformation (recovery) of the fibers in the original state. However, decreasing the resistance between the fibers of the clothing will also facilitate

the formation of a wrinkled state of the clothing. Application of the disclosed composition on clothing leads commonly to a WRA up to about 200 degrees.

It is an object of the invention to provide a novel compound which improves wrinkle resistance in fabrics, without facilitating the formation of a wrinkled state of the fabrics.

This object of the invention is achieved by a compound as mentioned in the opening paragraph, characterizing in that the wrinkle reducing active further comprises a filler compound which is at least partially provided with chemically crosslinked particles. Applying of a filler compound with crosslinked particles in combination with a fusible elastomer will commonly lead to a significantly higher recovery of the fabric when compared to the recovery according to the prior art. Application of the compound according to the invention will namely commonly lead to a WRA of significantly above 200 degrees. In particular, the active according to the invention will form elastic bridges between the fibers of the fabric under normal conditions, so that deformation of the fabric will commonly result in a lasting recovery of the fibers in their original orientation. Thus, the crosslinked particles provide – in combination with the fusible polymer – an elastic binding between the fibers with a certain memory, which enables it to recover relatively easily after bending or creasing of the fibers. Preferably, the crosslinked particles are captured in a matrix of the fusible elastomer. As crosslinked particles e.g. polybutadiene, natural rubber, crosslinked silicones, such as crosslinked polydimethylsiloxane, and polymeric microfibers can be used. As fusible elastomers e.g. aliphatic polyester polyurethane, aliphatic polyether polyurethane or a acrylate copolymer of butyl acrylate and acrylic acid with a relatively low glass transition temperature (Tg), preferably in a ratio of 80: 20, can be used. The liquid carrier used in the compound of the present invention is preferably an aqueous system comprising water. Optionally, in addition to water, the carrier can comprise another liquid solvent which is well soluble in water, such as an alcohol.

In a preferred embodiment of the invention the filler compound consists entirely, or at least substantially, of chemical crosslinked particles. Thus advantage can be taken of the elastic property of the crosslinked particles in an optimal way. For example a polydimethylsiloxane like Dow Corning C 1716® can be used, which directly binds in the matrix formed by the fusible elastomer.

In another preferred embodiment the filler compound is provided with a thermoplast, preferably polymethylmethacrylate (PMMA). In this manner the filler compound consists particularly of particles comprising at least two compositions, i.e. the

crosslinked composition which provide an elastic property to the compound, and a non-crosslinked composition formed by a thermoplast for improving the binding of the filler compound to the matrix formed by the fusible elastomer. The filler compound according to this embodiment can be constructed in a laminar way, whereby each layer consists of specific compositions. Thus, it is also possible to provide for example a so called 'core-shell' filler particle, which consists at least substantially of an elastic core formed by said crosslinked composition, which core is surrounded by a substantially non-elastic shell formed by said thermoplastic composition. As crosslinked composition for the core, e.g. Estapor® carboxylated micro-spheres of SBS copolymer of Merck can be used.

Preferably, the filler compound has an at least substantially spherical shape. However, in a preferred embodiment the filler compound has an at least substantially fibrous shape, such as micro-fibers. Other shapes can also be used to give the desired anti-wrinkle effect.

The content of the active in the liquid carrier is between 2 and 60 weight percent. Between these values a good dispersion of the active in the liquid carrier can be obtained and maintained. If said percentage of 60 percent is (significantly) exceeded commonly a sticky, non-controllable dispersion is obtained. Preferably the filler compound content in the active is between 10 and 30 weight percent, preferably 20 weight percent. In this way a stable matrix of fusible elastomer can be obtained, in which the crosslinked fillers are captured.

In an embodiment of the compound according to the present invention the elastomer has a softening temperature between 50 and 100 degrees Celsius in the presence of water. Easy softening of the elastomer at an increased temperature results commonly in an easy provision of the yarns of the fabric with the compound according to the invention. The viscosity of the softened compound is relatively very low, which means that, e.g. during ironing of said fabric, as long as the fabric is relatively hot, the polymers do not interfere with the wrinkle removal of the fabric. When the fabric cools down, the compound according to the invention solidifies to form an elastic films around and between the yarns or individual fibers, thereby inducing a degree of elasticity in the treated fabric. This in turns improves the WRA value substantially.

In another preferred embodiment of the compound according to the present invention the active is removable by washing. If a fusible elastomer is applied, which is removable by washing, commonly the active as a whole, inclusive the crosslinked fillers, is washed out. An example of a fusible elastomer which is removable by washing consists

substantially of a copolymer of butyl acrylate and acrylic acid, preferably in the ratio of 80:20. However, it is also conceivable to apply a more durable active, which is not, or at least hardly, removable by washing. Examples of such durable actives are aliphatic polyester polyurethane (Permutex® RU 13-011) and aliphatic polyester polyurethane (Permutex® RU-4049).

The compound according to the invention is preferably provided with additives, such as surfactants, perfumes, anti-bacterial additives, silicones for improving gliding between the fibers of the fabric, et cetera, as long as the additive does not interfere with the primary function of the polymer. The use of additives in a compound according to the invention can be very suitable when applying the compound on a fabric by means of a domestic appliance, such as a washing machine or an iron.

The invention also relates to a wrinkle reducing active as used in said compound and to a cartridge comprising said compound which is suitable to be used in an iron.

The invention further relates to a method for improving wrinkle resistance in a fabric by use of said compound, comprising the steps of: A) applying the compound on the fabric, B) removing the wrinkles in the fabric, and C) permitting the liquid carrier to evaporate at least partially. The amount of active typically applied, particularly sprayed, onto the fabric is preferably from about 0,1 to about 10 weight percent, more preferably from about 0.5 to about 5 weight percent of the weight of the fabric. Once an effective amount of compound is sprayed onto the fabric, the fabric is stretched or smoothed by hand according to step B). After the effective amount of compound is applied to the fabric and preferably stretched, the liquid, in particular moisture, is permitted to evaporate at least substantially. The evaporation can occur both in a passive way or in an active way by increasing the temperature of the fabric. Evaporation of the moisture is commonly relevant, as the particles of the fusible elastomer will stick together and thus form a solidified sheath around the fibres and yarns of the fabric. Further, evaporation of moisture will commonly also result in stress relaxation in the yarns of the fabric. A decrease in the stored energy will maintain the fabric in its set, i.e. flat, state.

Preferably, the applying of the compound on the fabric according to step A) is realised by means of a domestic appliance. Examples of such domestic appliances are a washing machine, an iron provided with a compound spraying reservoir, and other spraying devices for a compound according to the invention.

In a preferred embodiment of the invention the removal of the wrinkles in the fabric according to step B) is realised by means of an iron at an increased temperature compared to an environmental temperature. In this way step C) will commonly be applied during application of step B). Thus, the increased temperature will lead both to an accelerated evaporation of applied liquid as to softening of the fusible elastomer. Cooling down of the fabric results commonly in an elastic protective layer formed around the stretched yarns of the fabric, whereby the layers are bound to each other by elastic bridges. Deformation of the fabric after applying the method according to the invention will temporarily lengthen said elastic bridges, which attempt to bring the yarns in their original stretched, non-wrinkled state during a certain time.

The invention can further be illustrated by way of the following non-limitative examples and of a single figure showing an iron with a cartridge comprising the claimed compound.

Example 1

A 12.5% (by weight) dispersion of a mixture of Permutex RU-4049® 40% aqueous emulsion and Estapor® 10% latex (175 - 225 nm core-shell particles consisting of a crosslinked elastomeric polystyrene-co-butadiene core and a carboxylated shell) in water was prepared by mixing the aforementioned emulsions with water in such a ratio that the amount of Estapor® was 10% based on the Permutex RU-4049®, (i.e. 1:9) hence 1.25% based on the total weight of the dispersion. This composition was then sprayed on to a piece of fabric (cotton type 407) such that the total pick-up based on the fabric weight was 40%. This led to an additive pick-up of 5% based on the fabric weight, when the fabric was dry. The fabric was then ironed using an iron set to a temperature suitable for cotton, till the fabric was dry. After conditioning the fabric for 24 hours, the WRA was measured for a piece of fabric with a size of 40 mm x 15 mm in both in the warp and weft directions according to the standard AATCC method 66-1998. The average WRA value obtained from fabrics treated as above was compared with WRA measurements carried out on fabrics that were ironed without the application of any additives (reference value) as well as fabrics which were ironed after the application of 5% based on the weight of the fabric of only Permutex RU-4049®. The results are summarised in the table below where Permutex RU-4049® is referred to as RU-4049 and the Estapor® latex is referred to as Estapor.

Treatment	WRA
Reference	140°
5% RU-4049	200°
5% (RU-4049 + Estapor 9:1)	210°

Example 2

A 12.5% (by weight) dispersion of a mixture of Permutex RU-4049® 40% aqueous emulsion and Dow Corning 1716® 30% aqueous microemulsion (crosslinked PDMS, polydimethylsiloxane) in water was prepared by mixing the aforementioned emulsions with water in such a ratio that the amount of Dow Corning 1716® was 20% based on the Permutex RU-4049® (i.e. 1:4), hence 2.5% based on the total weight of the dispersion. This composition was then sprayed on to a piece of fabric (cotton type 407) such that the total pick-up based on the fabric weight was 40%. This led to an additive pick-up of 5% based on the fabric weight, when the fabric was dry. The fabric was then ironed using an iron set to a temperature suitable for cotton till the fabric was dry. After conditioning the fabric for 24 hours, the WRA was measured for a piece of fabric with a size of 40 mm x 15 mm in both in the warp and weft directions according to the standard AATCC method 66-1998. The average WRA value obtained from fabrics treated as above was compared with WRA measurements carried out on fabrics that were ironed without the application of any additives (reference value) as well as fabrics which were ironed after the application of 5% based on the weight of the fabric of only Permutex RU-4049®. The results are summarised in the table below where Permutex RU-4049® is referred to as RU-4049 and the Dow Corning 1716® is referred to as DC-1716.

Treatment	WRA
Reference	140°
5% RU-4049	200°
5% (RU-4049 + DC-1716 4:1)	225°

The figure shows an example of an iron with an exchangeable reservoir for containing the claimed additive compound. The iron comprises a housing 1, a sole plate 2, a heating element 3 for heating the sole plate, an exchangeable reservoir for containing the additive compound 5, and a spraying nozzle means 6. The exchangeable reservoir 4 may be a kind of cassette or cartridge with a hard synthetic resin housing. The bottom 7 of the

exchangeable reservoir 4 is provided with an outlet 8 for the compound 5. A coupling piece 9 is connected at the lowerside of the bottom 7, which coupling piece has a duct 10 of which an inlet is in communication with the outlet 8 of the reservoir 4 and of which an outlet terminates in an outlet tube 11. The coupling piece 9 may be integral with the cartridge in the first preferred embodiment. The iron comprises a delivery system 12 for delivering the compound 5 from the exchangeable reservoir 4 to the nozzle means 6 in order for it to be sprayed on the cloth to be ironed. The delivery system comprises a first channel 13, an outlet thereof being connected to an inlet of an electric pump 14 arranged inside the housing of the iron, and a second channel 15, an inlet thereof being connected to an outlet of the pump 14. An inlet of the channel 13 is provided with a coupling sleeve 16 for coupling to the outlet tube 11 of the coupling piece 9. An outlet of the second channel 15 is provided with a coupling sleeve 17. According to the invention, the exchangeable reservoir 4 is provided with the nozzle means 6. The nozzle means comprises a nozzle tube 18 terminating in a nozzle 19 having an aperture 20. An inlet of the nozzle tube forms a coupling tube 21 for coupling to the coupling sleeve 17 of the second channel 15. The exchangeable reservoir 4 can be inserted into a cavity 22 of the iron. A pivotable cover 23 can close the cavity 22. When a spray of compound is desired, the user starts the pump 14 by pressing a knob 24. The pump sucks the additive compound 5 from the reservoir 4 into the channel 13 and pumps it via the channel 15 and the nozzle tube 18 towards the nozzle 19. The exchangeable reservoir 4 including the nozzle means 6 can be implemented as a disposable cartridge, so that every new cartridge is provided with clean nozzle means.

CLAIMS:

1. Compound to improve wrinkle resistance in fabrics, comprising:
- a wrinkle reducing active, comprising at least one fusible elastomer, and
- a liquid carrier for carrying the active,

characterized in that the wrinkle reducing active further comprises a filler compound which is at least partially provided with chemically crosslinked particles.

2. Compound according to claim 1, characterized in that the filler compound consists entirely of chemical crosslinked particles.

3. Compound according to claim 1, characterized in that the filler compound is provided with a thermoplast, preferably polymethylmethacrylate (PMMA).

4. Compound according to one of the foregoing claims, characterized in that the content of the active in the liquid carrier is between 2 and 60 weight percent.

5. Compound according to one of the foregoing claims, characterized in that the filler compound content in the active is between 5 and 50 weight percent, preferably between 10 and 20 weight percent.

6. Compound according to one of the foregoing claims, characterized in that the elastomer has a softening temperature between 50 and 150 degrees Celsius in the presence of water.

7. Compound according to one of the foregoing claims, characterized in that the compound is provided with additives, preferably a surfactant or a perfume.

8. Wrinkle reducing active as used in a compound according to one of the foregoing claims 1-7.

9. Cartridge for an iron comprising a compound according to one of the claims 1-7.

ABSTRACT:

The invention relates to a compound to improve wrinkle resistance in fabrics, comprising: a wrinkle reducing active, comprising at least one fusible elastomer and cross-linked particles, and a liquid carrier for carrying the active. The invention also relates to a wrinkle reducing active as used in such a compound and a cartridge for an iron comprising such compound.